

CHAPTER 100 POLICY AND PROCEDURES

SECTION 101 INTRODUCTION

101.01 Purpose

This Manual provides a guidebook of engineering design and construction standards for proper stormwater management for those engineers, builders, contractors, land planners, and property owners contemplating some form of land alteration within the City of Indianapolis, Marion County, Indiana. The City may also enter into interlocal agreements to extend jurisdiction of the Section 561 Drainage and Sediment Control Ordinance and this Manual to excluded cities within Marion County. Included are departmental policies relating to stormwater management and flood control, submittal requirements and procedures for issuance of a stormwater permit, and procedures for inspection, testing, and final acceptance of stormwater facilities.

The contents of this Manual have been adopted by the Department of Public Works (the "Department") in conformance with standard promulgation procedures listed in Section 561 - 321 "Authorization to promulgate regulations" to accomplish the following objectives:

- Provide for consistent, high quality project evaluation and design by consolidating current departmental standards and "policies" within a single, well organized, and easily referenced document.
- Provide a clear explanation of what is required for stormwater management plan submittals and project reviews.
- Ensure consistency in review of stormwater permit applications and land alteration plans by the stormwater permit staff.
- Improve the ability of contractors to properly and consistently install stormwater facilities, with a high level of workmanship, according to the approved stormwater management plan.
- Meet community needs for minimizing the impacts of new development and redevelopment projects on existing stormwater management facilities.

This Manual was developed with the assumption that its user will possess a basic understanding in the area of civil engineering design, construction, or land alteration, depending upon that persons particular area of expertise. Readers of this Manual which are not qualified by education and experience in the field of construction, engineering, or land alteration should consult with a more qualified person or persons possessing professional expertise in one or more of these fields prior to application of the requirements set forth herein.

This Manual, together with all future revisions, shall be referred to as the "City of Indianapolis Stormwater Design and Construction Specifications."

All information required to be submitted by this Manual will be made available to any person upon written request to the Division.

101.02 Applicability

This Manual applies to all projects as stated and defined in Section 561 - 103 "Land alterations to be accomplished in accordance with drainage

requirements" and Section 561 - 109 "Land alteration defined." These sections of the ordinance state that any land alteration must be accomplished in conformity with stormwater requirements where the definition of land alterations shall mean any on-site or off-site action taken relative to land which either:

1. Changes the contour; or
2. Increases the runoff rate or volume; or
3. Changes the elevation; or
4. Decreases the rate at which water is absorbed; or
5. Changes the drainage pattern; or
6. Creates or changes a stormwater facility; or
7. Involves construction, enlargement or location of any building on a permanent foundation; or
8. Increases the delivery of point and/or non-point source pollution to streams; or
9. Creates an impoundment.

This Manual should be used in conjunction with Section 561 (Drainage and Sediment Control). Additional requirements related to land alteration may be found in Zoning Ordinance 92-AO-6 (Flood Control Districts Zoning Ordinance). Exceptions to the provisions of this Manual are provided in Section 561 - 221 "When drainage permits required; enforcement; exceptions."

Improvements to an existing developed site that is not developed to current stormwater design standards and disturbs \Rightarrow 1/2 acre will be required to comply with the current stormwater regulations for storm water quantity and quality, at twice the area disturbed within the existing contributing drainage area at the proposed site work and owned by the project/property owner. For example if a property owner wants to add 1 acre of parking and plans to disturb 1.5 acres to do it, he would be required to mitigate 3 acres of development within the same watershed to meet the current storm water regulations. If there was only an additional .75 acres of existing contributing drainage area upstream of the disturbed area, the owner would be required to mitigate 2.25 acres of development.

101.03 Stormwater Manual Organization

The manual is organized to present the technical and engineering procedures and criteria needed to comply with the City of Indianapolis stormwater regulations. Copies of the Section 561 (Drainage and Sediment Control) and Zoning Ordinance 92-AO-6 (Flood Control Districts Zoning Ordinance) are presented in the Appendices of this Chapter. In addition, the general design policy and procedures are presented.

Each chapter contains an initial section that presents all of the policy and procedures that must be met for approval. These policy and procedures can be considered as design criteria that are unique for approval within the County of Marion. Bold text occurring throughout the manual

represents design criteria that must be satisfied. The second section of each chapter contains the technical information that is considered acceptable to the Department of Public Works.

101.04 Updating

The process of updating this Manual will be in accordance with Section 561 -321. "Authorization to promulgate regulations". This manual will be updated and revised, as necessary, to reflect up-to-date engineering practices and information applicable to the City of Indianapolis area. Changes to the manual will be posted on the City's website as they are produced. Notification of the changes will be emailed to the DPW listserver registrants and posted on the City website.

Notwithstanding Section 141-208 (b) of the Revised Code of Indianapolis and Marion County, this Manual shall remain in effect until repealed or amended by the Board of Public Works pursuant to Chapter 141 of the Code.

101.05 Definitions and Abbreviations

Whenever in these Standards or in any documents or instruments where the Standards govern, the following terms, abbreviations, or definitions are used, the intent and meaning will be interpreted as follows:

1. Abbreviations

ASTM	American Society of Testing and Materials
AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
CADD	Computer Aided Design and Drafting
CCTV	Closed Circuit Television
CFS	Cubic Feet per Second
CMP	Corrugated Metal Pipe
DMD	Department of Metropolitan Development
DPW	Department of Public Works
EPA	Environmental Protection Agency
Ft	Feet
GIS	Geographic Information System
HDPE	High Density Poly Ethylene
IAC	Indiana Administrative Code
IC	Indiana Code
IDEM	Indiana Department of Environmental Management
IMAGIS	Indianapolis Mapping and Geographical Infrastructure System
INDOT	Indiana Department of Transportation
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
O&M	Operations and Maintenance
PVC	Poly Vinyl Chloride
RCP	Reinforced Concrete Pipe
SCS	Soil Conservation Service
SQU	Stormwater Quality Unit
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids

2. Definitions

ACCEPTANCE: The formal written acceptance by the Division or Department of an entire project which has been completed in all respects in accordance with the approved plans, specifications, and this Manual including any previously approved modifications thereof.

ADMINISTRATOR: Administrator of the Office of Code Enforcement, or their authorized representative.

ANTECEDENT SOIL MOISTURE CONDITIONS: Soil moisture conditions of the watershed at the beginning of a storm. These conditions affect the volume of runoff generated by a particular storm event. Notably they affect the peak discharge only in the lower range of flood magnitudes. As the frequency of a flood event increases, antecedent moisture has a rapidly decreasing influence on runoff.

APPLICANT: The property owner and/or their agent who requests and fills out an application for any type of permit or agreement required by this Manual.

APPROVAL: Decision that allows the applicant to proceed to the next step of the permitting process set out in this Manual.

BACKFILL: Material used to replace material removed from trenches during construction which is above the haunching (See Figure 501.04).

BEDDING: The material used in the trench to a minimum depth below the bell/barrel of the pipe for the purpose of properly supporting the pipe (See Figure 501-04).

BMP OWNER: The owner of the BMP, typically the property owner. The BMP owner may also be the lessee of property in the case of long term leases of commercial or industrial zoned properties. The lessee is considered the BMP owner only if the lease specifically states that construction by the lessee must meet applicable local codes and regulations.

BMP, GENERAL: Best management practice can refer to a structural measure (wetland, pond, sand filter, etc.) or non-structural measure (restrictive zoning, reduced impervious areas, etc.). BMPs are designed for the benefit of water quality and quantity control. For the purposes of this chapter, BMPs refer to structural water quality BMPs.

BMP, MANUFACTURED: Manufactured BMPs are wholly or partially prefabricated and delivered to a construction site for incorporation into the drainage system. Water quality inlets, cartridge filter systems, and hydrodynamic separators are examples of manufactured BMPs.

BMP, NATURAL: Natural BMPs are practices that utilize the natural infiltration and filtering processes of water flowing through vegetation, sand, soil, or other media to remove suspended and or dissolved pollutants from runoff. Examples include biofilters, rain

gardens, vegetated swales.

BMP, NON-STRUCTURAL: Non structural BMPs are comprised of a wide range of activities and/or practices that control or reduce pollutants at their sources. Practices can include the use of natural processes, such as increased infiltration and bio-filtration, good housekeeping practices such as street sweeping or catch basin cleaning, or reduction of directly connected impervious areas. Activity based BMPs include public education, outreach, and involvement activities, such as drain marking and creek sweeps, zoning and regulation.

BMP, STRUCTURAL: Structural BMP, for the purposes of this manual, are BMPs that are built on site. Detention ponds, artificial wetlands, sand filters, and bio-filters are examples of structural BMPs.

BOARD: The Board of Public Works – City of Indianapolis.

BRIDGE: A conveyance structure that is hydraulically short and has a cross sectional flow-through area greater than 100 square feet.

CITY: The City of Indianapolis.

CLEAN FILL: Uncontaminated nonwater-soluble, non-decomposable, inert solid, such as rock, soil, gravel, concrete, and/or clay products. Clean fill shall not mean processed or unprocessed mixed construction and demolition debris, including, but not limited to, wallboard, plastic, wood or metal. The non-water soluble, nondecomposable inert products generated from an approved Class B recycling facility are considered clean fill. Clean fill cannot include any hazardous material and must comply with environmental regulations.

CODE: Municipal Code of the City of Indianapolis

COMBINED SEWER: A sewer which has been designed or intended to receive both surface runoff and sewage.

COMMON LATERAL: A lateral which serves more than one building or residential unit.

CONTRACTOR: Any Contractor who meets the Department's requirements and is licensed by the Department of Metropolitan Development to enter into contracts for and to perform the work of installing storm sewers under the Department's jurisdiction.

CONTRIBUTING DRAINAGE AREA: Contributing drainage area refers to the total area that contributes runoff upstream of a point of interest, such as a development site.

COUNTY: The county of Marion, State of Indiana.

CRITICAL DEPTH: Critical depth is the depth of flow at which the specific energy is a minimum. An illustration of critical depth is the depth at which water flows over a weir when no other backwater forces are involved. For a given discharge and prismatic cross-

section geometry there is only one critical depth.

CULVERT: A structure that conveys any flow collected in an open ended pipe (i.e., headwall, flared end section, mitered end), a cross-drain. Typically this is through a roadway embankment or past some other type of flow obstruction.

DEDICATION: The inspection, and if necessary, the rehabilitation of a sanitary sewer facility for public acceptance, ownership, operation, and maintenance.

DEPARTMENT: Department of Public Works, City of Indianapolis, and any Division therein.

DEPRESSION STORAGE: The natural depressions within a watershed which store runoff. Generally after the depression storage is filled runoff will commence.

DETENTION: Any process or facility that detains stormwater runoff, reducing the peak flow rate from the drainage area and prolonging the duration of the rain event hydrograph.

DIGITAL DATA SUBMISSION STANDARDS: Standards in which the City of Indianapolis can integrate CADD drawings into the GIS and IMS environment thus maintaining the integrity and positional accuracy of the data.

DIRECTOR: Director of the Department of Public Works, City of Indianapolis, or their authorized representative.

DIVISION: The Office of Code Enforcement, or their authorized representative

EASEMENT: Areas along the line of all public drainage facilities which are outside the road easements or rights-of-way, and are recorded and dedicated to the Department granting rights along the line of the drainage facility.

EFFECTIVE DRAINAGE AREA: The drainage area from a specific site, excluding offsite drainage, where offsite drainage either does not exist or bypasses the site through culverts or other means.

ENGINEER: The Engineer for the Owner.

EXISTING CONDITIONS: The site conditions that existed on the property 12 months prior to the date of application for a drainage permit.

FIELD TILE/SUBSURFACE DRAIN: Under drain systems in fields that have been installed for the purpose of dewatering fields that are subject to seasonably high water tables.

FINAL BACKFILL: Material used to replace material removed from trenches during construction which is above the initial backfill (See Figure 501.04).

FIRST FLUSH: The first flush is a term applied to the onset of the

rainfall/runoff process wherein most loose, unattached pollutants on the land or street surface are readily entrained into the stormwater runoff and wash off the surface into the drainage system. For many pollutants their highest concentrations during the runoff event will occur during the first flush.

FLOATING DEBRIS (FLOATABLES): Any solid waste that, due to its physical properties, will float on the surface of water. For the purposes of this manual, the term does not include naturally occurring floatables, such as leaves or tree limbs.

FOUNDATION DRAINS: Any network of pipes, pumps or drainage mechanism located at, near, or under a footing, foundation or floor slab of any building or structure that intentionally or unintentionally conveys groundwater away from a building or structure.

FREE OUTLETS: Outlets whose tailwater is equal to or lower than critical depth. For culverts and storm drains having free outlets, lowering of the tailwater has no effect on the discharge or the backwater profile upstream of the tailwater.

FREEBOARD: An additional depth regarded as a safety factor, above the peak design water elevation.

FREQUENCY: The average time interval between equal magnitude floods. For example, a 25-year flood has the probability of occurrence of once every 25 years on the average, or a 4 percent chance of occurrence in any given year.

HAUNCHING: The area in the trench from the top of the bedding to the springline of the pipe. (See Figure 501.04).

HYDRAULIC ROUGHNESS: A composite of the physical characteristics that influence the flow of water across the earth's surface, whether natural or channelized. It affects both the time response of a watershed and drainage channel as well as the channel storage characteristics.

HYDROGRAPH: Graph of the time distribution of runoff from a watershed.

HYETOGRAPH: Graph of the time distribution of rainfall over a watershed.

IMPERVIOUS AREA: Impervious areas are areas where the land surface has been altered in a manner that decreases the amount of rainwater infiltration. Impervious surfaces include rooftops, roads, parking areas, patios, and other surfaces that retard the infiltration of rainwater or snowmelt into the ground.

INFILTRATION: Complex process of allowing runoff to penetrate the ground surface and flow through the upper soil surface. The infiltration curve is a graph of the time distribution at which this occurs.

INITIAL BACKFILL: Material used in the trench above the haunching. (See Figure 501.04).

INNOVATIVE BMP: Innovative BMPs, for the purposes of this manual, are any BMPs that are not on the list of traditional structural BMPs identified in Section 702. Innovative BMPs are primarily, though not exclusively, manufactured stormwater quality units.

INTERCEPTION: Storage of rainfall on foliage and other intercepting surfaces during a rainfall event is called interception storage.

INVERT: Flowline of the culvert (inside bottom).

LAG TIME (T_l): The time from the centroid of the excess rainfall to the peak of the runoff hydrograph.

LAND DISTURBANCE: Any manmade change of the land surface, including: removal of vegetative cover that exposes the underlying soil, excavating, filling, transporting, and grading.

LAND SURVEYOR: A person registered as a land surveyor by the Indiana State Board of Registration as provided by Indiana Code (IC) 25-21.5.

MAINTENANCE: Maintenance activities include cleaning, spraying, removing obstructions from and making minor repairs in a drainage facility so that it will perform the function for which it was designed and constructed. Maintenance activities do not require a drainage permit.

MANHOLE: A structure used in a sewer system to provide access for maintenance.

MANUAL: The City of Indianapolis Department of Public Works Stormwater Specifications and Design Standards. Same as Standards.

MANUFACTURER: The producer of those materials required by this Manual having direct responsibility and authority for the satisfaction of those minimum material specifications set forth herein.

MILD SLOPE CULVERT OPERATION: operation where critical depth is less than uniform depth.

NEW CONNECTION: Shall mean a connection to the drainage system, or a repair, replacement or modification to an existing drainage system element that increases the capacity of the system to accommodate a proposed increase in the average daily flow.

OFFLINE STRUCTURE: Offline structures are BMPs that treat only a fraction of the site stormwater runoff for water quality purposes. Flows not treated by the BMP bypass the structure and re-enter the watercourse below the BMP.

OWNER: Any individual, partnership, firm, corporation or other entity who, as property owner, is initiating the Work.

PARTIALLY SUBMERGED OUTLET: An outlet whose tailwater is

higher than critical depth and lower than the height of the culvert.

PEAK DISCHARGE (Q_p): The maximum rate of flow of water passing a given point during or after a rainfall event. Also called the PEAK FLOW.

PERMIT: Clearance to perform specific work under specific conditions at specific locations.

PLANS: Construction plans which show the location, character, dimensions, and details of the work to be done.

PROFESSIONAL ENGINEER: A person registered as a professional engineer by the Indiana State Board of Registration for Professional Engineers under IC 25-31.

RECONSTRUCTION / REHABILITATION: Reconstruction or rehabilitation mean any material change from the original concept of the drainage feature, including its capacity. Reconstruction/rehabilitation activities require a drainage permit.

RAINFALL EXCESS: After interception, depression storage, and infiltration have been satisfied, if there is excess water available to runoff this is the rainfall excess.

RECORD DRAWING (AS-BUILTS): Plans certified, signed and dated by a professional engineer or land surveyor registered in the State of Indiana, indicating the Plans have been reviewed and revised, if necessary, to accurately show all as-built construction and installation details including, but not limited to, key elevations, locations and distances.

REDEVELOPMENT: Redevelopment means any construction, alteration, or improvement where structures are removed and/or replaced. Where the disturbance caused by redevelopment activities disturbs less than 0.5 acres, no water quality BMP plan shall be required. Staff has the discretion to exempt redevelopment activities disturbing up to 5% more area.

REGIONAL DETENTION/RETENTION: Regional facilities provides flood storage for off site and/or on-site watershed areas of five (5) acres or larger.

RETENTION: Stormwater retention is a practice or structure whose primary focus is to retain stormwater on-site through evapotranspiration or infiltration.

RIGHT-OF-WAY: All land or interest therein which by deed, conveyance, agreement, easement, dedication or process of law is reserved for or dedicated to the use of the general public, within which the Department shall have the right to install and maintain drainage facilities.

SEWER: A pipe for carrying wastewater (sanitary sewer), storm water (storm sewer) or a combination of both (combined sewer). Wherever in these Standards the word "sewer" is used without distinguishing type, "sewer" shall mean storm sewer.

SPECIFIC ENERGY: The sum of the depth and velocity head of the flow. Sometimes called "specific head."

STAGE The stage of a channel is the elevation of the water surface above some elevation datum.

STANDARD DRAWINGS (DETAILS): The drawing of structures, storm sewer lines or devices commonly used and referred to on the Plans and in this Manual.

STANDARDS: The City of Indianapolis Department of Public Works Stormwater Design and Construction Specifications Standards. The requirements for the design and construction of drainage facilities within the Indianapolis as contained herein and all subsequent additions, deletions or revisions. Same as Manual.

STEEP SLOPE CULVERT OPERATION: condition where the computed critical depth is greater than the computed uniform depth.

STOP WORK ORDER: An order requiring the suspension of the pertinent construction activity for any construction project within the City of Indianapolis.

STORM DRAIN: Underground pipe system designed to intercept and convey stormwater runoff to an adequate outlet.

STORMWATER QUALITY MANAGEMENT: A system of vegetative, structural, and other measures that reduce or eliminate pollutants that might otherwise be carried by surface runoff.

STORMWATER: Any flow occurring during or following any form of natural precipitation and resulting therefrom.

SUBMERGED INLET: An inlet having a headwater greater than (1.5D).

SUBMERGED OUTLET: An outlet having a tailwater elevation higher than the crown of the culvert.

TAILWATER: Standing or running water, and specifically its elevation, outside the downstream or outlet end of a culvert or storm drain system.

TIME OF CONCENTRATION (t_c): The time required for water to flow from the most remote point of the basin to the location being analyzed. Thus the time of concentration is the maximum time for water to travel through the watershed, which is not always the maximum distance from the outlet to any point in the watershed.

TREATMENT TRAIN: A treatment train consists of more than one BMP in series treating stormwater runoff. Such configurations are necessary when BMPs individually cannot meet either the 80% TSS reduction or floatable control goal.

UNIFORM FLOW: Flow in a prismatic channel of constant cross section having a constant discharge, velocity and depth of flow

throughout the reach. In uniform flow it is assumed that the depth of flow is the same at every section of the channel.

UNIT HYDROGRAPH: The direct runoff hydrograph resulting from a rainfall event which has a specific temporal and spatial distribution and which lasts for a specific duration of time (thus there could be a 5-, 10-, 15-minute, etc., unit hydrograph for the same drainage area). The ordinates of the unit hydrograph are such that the volume of direct runoff represented by the area under the hydrograph is equal to one inch of runoff from the drainage area.

WATERBODY: Any area that in a normal year has water flowing or standing above ground to the extent that evidence of an ordinary high water mark is established.

WATERSHED: A drainage area or region consisting of all the land from an identified, delineated or circumscribed drainage divide draining to a single identified drainage outlet or stream mouth.

WORK: All the activities to be done under the permit, in accordance with the approved plans, specifications, these Standards, and conditions.

101.06 Enforcement of Standards

Failure to comply with requirements set forth by this Manual may necessitate enforcement actions by the Administrator or Director in accordance with Sections 561 – 261:266 of the City Code.

101.07 Penalties

Any person violating any provisions of this Manual shall be subject to the penalties in accordance with Section 561 - 265 of the City Code and may be required to correct such violation at their expense.

SECTION 102 PLAN SUBMITTAL POLICY AND PROCEDURES

102.01 Professional Certification

Professionally certified site plans, specifications, and supporting computations shall be submitted to the Department, by a registered professional as defined in Section 561 - 111, for review and approval prior to the initiation of any on-site land alteration as required by Section 102.03, "Platted Subdivisions, Commercial, and Industrial Developments of this manual. The certification should be in the form provided by the "Certification of Sufficiency of Plan" presented on page A1-1.

102.02 Plan Submittal and Approval Process

A stormwater permit may be issued if the criteria listed in Section 561 – 222, "Eligibility to obtain permit," and Section 561 – 223, "Application, issuance" of the City Code have been met. The process illustrated in the flowchart shown in Figure 102-1 on page A1-2 should be followed in order to complete the entire land alteration process. It should be noted that the stormwater permit process is only a portion of the processes shown on the flowchart. Furthermore, it should be noted that this flowchart represents the processes related to platted development or developments larger than 5 acres. Some of the processes may be bypassed as noted in the following sections for non-platted development smaller than 5 acres. As a general

rule, all land alterations will require a:

1. Stormwater Permit Application;
2. Stormwater Plans;
3. Technical Information Report;
4. Sediment and Erosion Control Plan.
5. Operation and Maintenance Manual for all detention, stormwater, and water quality structures,
6. Drainage Permit Checklist.

Each of these is described in the following Sections. A sample stormwater permit application is provided on page A1-3. Furthermore, every site development project is different in nature and scope that may result in the plan approval process being altered to accommodate the specific considerations of the project. Therefore, the designer should consider a pre-design meeting at which any alterations to the plan submittal process are discussed and documented.

Progress toward completion of approved drainage plans and associated drainage permits is subject to the time constraints defined in Section 561-224, "Professionally prepared and certified drainage plans" and Section 561-226, "Expiration of permit by operation of law; extensions" of the City Code.

The zoning of any properties for which drainage permits are applied must be consistent with the proposed land use before drainage permits will be approved.

On-site land alteration, including clear cutting, stump removal, grading, and filling, shall not commence prior to approval of a drainage permit and installation of all sedimentation and erosion control devices required by the approved permit.

102.03 Platted
Subdivisions,
Commercial, and
Industrial Developments

Stormwater plans shall be submitted to the Department of Metropolitan Development for approval for sites that comply with the criteria listed in Section 561 – 222, "Eligibility to obtain permit," and Section 561 - 223, "Application, issuance" of the City Code. The following information must be submitted for approval:

1. Construction Features. The stormwater plan shall demonstrate and describe surface and subsurface drainage and include the following:
 - a. Stormwater plan: The stormwater plan shall be drawn to scale, preferably one (1) inch per fifty (50) feet, or a sufficient scale to accurately depict all features that affect stormwater design, and an arrow indicating north shall appear on each page. Due to filing limitations, the stormwater plan shall be presented on a maximum plan sheet size of 24 inch by 36 inch. Existing and proposed on-site land contours shall be shown at one-foot contour intervals except where slopes are steeper than twenty (20) percent. Off-site watershed boundary maps can be submitted at

an appropriate contour interval sufficient to depict drainage areas and slopes. A benchmark, which is easily accessible and re-locatable, shall be shown. The benchmark may be assumed at the discretion of the Director if the area contains less than three (3) acres, but otherwise shall be determined by USGS datum.

- b. Cover Sheet: A cover sheet shall be provided, including location and vicinity map. A map that indicates the location and vicinity of the proposed land alteration shall be included in the stormwater plan. It shall reference a nearby major roadway intersection. The cover sheet shall also include site address, as assigned by DMD, the DMD Compliance Information Block and a stormwater structure summary table. The summary table shall provide each proposed pipe size and respective length with the number of proposed structures.
- c. Existing and proposed stormwater facilities: The stormwater plan shall show the locations of all existing and proposed stormwater facilities. Storm drains and manholes and other structures shall be located by dimensions on the plans in relation to surrounding physical features. However, the areas where physical features are not available, coordinates of manholes and bearings of storm drains shall be based either on the State of Indiana's coordinate system or latitude and longitude. Indiana's State Plane Coordinate System shall be used to identify the location of the outlet of each BMP included in the plan. The stormwater plan shall show the direction of flow, elevation of inverts, gradient, materials and size of existing and proposed storm drains.
- d. A drainage area map shall be presented which indicates all existing and proposed on-site and off-site drainage areas and flow paths to stormwater facilities, and the limits of the 100-year floodplain for all areas with contributing drainage watersheds of five acres or greater in accordance with Chapter 300 section 303.02;

For all Class 1 pipe (within the R/W or conveying runoff from more than one parcel), a plan and profile shall be submitted. Storm drain plan and profile: The plan shall be shown on the upper portion of the drawing. The plan, generally, shall be drawn on a scale that is clear and legible and not greater than one (1) inch equals fifty (50) feet.

The plan shall show appropriate right-of-way and easement limits with instrument numbers, as applicable. The profile shall be shown under the plan and shall extend a sufficient distance downstream of the outlet to allow any pertinent information concerning the outfall channel to be shown. All invert elevations and pipe slopes shall be listed. For each pipe the length, size, material and Class shall be annotated on the profile sheet near the dimension line. Detail title and/or number references shall be called out on the profile plan.

The storm drain and inlet profile shall generally be drawn on a scale of one (1) inch equals fifty (50) feet horizontal, one (1) inch equals five (5) feet vertical. Where a storm drain is located inside the limits of an existing or proposed pavement or

shoulder, the center line grade of the road shall be shown. Where a storm drain is located outside pavement or shoulder, the existing ground over the storm drain with proposed grading shall be shown. If the storm drain is to be constructed on fill, the profile of the undisturbed earth, at the storm drain location, shall be shown. All utility locations at intersections with the storm drain shall be shown.]

- e. The location of the predominant soil types on the site shall be described by a registered land surveyor or professional engineer. The description may be determined by the NRCS (Natural Resources Conservation Service, formerly the Soil Conservation Service, or SCS) County Soil Survey or an equivalent publication or as determined by a certified professional soil scientist.
2. Additional Information. The Director shall be empowered to require such additional information to evaluate and determine the adequacy of the proposed stormwater facility.
3. Certification Required. All stormwater plans submitted under this section to the Department for approval must be prepared by a registered professional engaged in storm drainage design under whose supervision the plans were prepared. The certificate shall be in the form of the "Certificate of Sufficiency of Plan" shown on page A1-1.
4. Obligation to Observe. For land alterations that are not to be inspected and tested by the City's inspection program, stormwater plans submitted under this section to the Department must include a "Certificate of Obligation to Observe" signed by a registered professional engaged in storm drainage design and by the Owner. The certificate shall be as presented on page A1-9. If for any reason the registered professional becomes uninvolved in the project prior to its completion, the Department of Metropolitan Development must be notified and a new registered professional must be retained by the Owner and both a new "Certificate of Obligation to Observe" and a new "Certificate of Sufficiency of Plan" document must be executed.

A plan submittal checklist is presented to aid the designer in preparing land development plans on page A1-4 through A1-5. In addition, a technical review checklist is provided on pages A1-6 through A1-8 that is used by Department staff during the stormwater permit application review process.

102.04 Technical Information Report

A completed Technical Information Report (TIR) which provides a summarization of calculations, existing site conditions, specific problem areas identified during site inspections, known neighborhood concern, zoning commitments related to storm water management, downstream conditions/restrictions with a justification for the level of downstream analyses performed, and a brief description of the planned stormwater management techniques which will be utilized to address these conditions, is required as part of the stormwater permit application. Each page and attachment of the TIR should be numbered and dated.

Included with this Technical Information Report shall be the following

information:

1. Design Calculations. Design calculations are required as part of the stormwater plan and shall, at a minimum, specifically include:
 - a. Estimation of storm water runoff. Runoff rates during the design and Q_{100} return interval storms; C-values or runoff curve numbers; and computed times of concentration. A time-of-concentration and time-of-travel calculation sheet has been provided on page A2-6. A C-value or runoff curve number computation sheet has been provided on page A2-15. Guidelines for determination of basin times-of-concentration and runoff rates are presented within Chapter 200 of this Manual, "Hydrology".
 - (1) Drainage area calculations including both the gross and impervious area for each drainage basin/subbasin;
 - (2) Weighted curve number or runoff coefficient computations;
 - (3) Time of concentration computation indicating overland flow time, shallow concentrated flow time, and flow time in the swale, gutter, pipe or channel.
 - b. Inlet grate and gutter flow computations as described in Section 305.07 and 305.08 of the Manual.
 - c. Closed conduit and open channel design computations:
 - (1) Size of pipe or channel cross section
 - (2) Pipe or channel inverts slope in percent;
 - (3) Material and roughness coefficient;
 - (4) Flowing velocities in feet per second;
 - (5) Design capacity in cubic feet per second as per Section 305.03 of this Manual.
 - d. Storm drain flow and hydraulic grade line computations as described in Section 305.03 and 305.04. A Storm Drain Flow Tabulation Form has been provided on page A3-14. A Headloss Calculation Sheet has been provided on page A3-16. A form to assist with completion of culvert ratings has been provided on page A3-7.
 - e. Erosion control methods. Such design calculations shall conform to the standards of 102.05 of this Chapter and all regulations promulgated there under.
 - f. BMP calculations. Pertinent calculations illustrating the correct computation of TSS removal, water quality volumes, pollutant load removal, etc, will be submitted using the forms included in Chapter 700 of the Manual.
2. An explanation of computer models used, where applicable, with information from input and output data.
3. Detention/retention summary information

102.05 Erosion and Sediment Control Plans

As stated in Section 561 - 381 "Conformance with minimum standards for land alterations", and Chapter 600 of this document, an erosion and sediment control plan is required for all non-single family residential land disturbing activities of any size, and all land disturbing activities that result in the disturbance of less than one acre of total land area and which are not part of a larger common plan of development or sale.

If the owner or operator is required to prepare a soil erosion control plan under Rule 5 (327 IAC 15-5), such plan shall be deemed to fulfill the requirements of Section 561. In this case, all applicable state and federal permits or notices for land disturbing activities shall be obtained or filed prior to commencement of land disturbing activities. All applicable state or federal standards shall be adhered to when conducting land disturbing activities. Copies of all applications, letters of intent submittals, plans and other erosion and sediment control related information developed for and/or submitted to state or federal authorities shall be copied to the Director of Metropolitan Development in addition to the ESCP.

Details concerning the ESCP can be found in Chapter 600.

102.06 Operations and Maintenance Manual

An operations and maintenance (O&M) manual for all private infrastructure, including but not limited to pipes, ponds, ditches, and BMPs (when required), shall be submitted for the final plan approval and permit process. The manual will become a maintenance guide for the drainage infrastructure once development is complete. The final O&M manual will be provided to the City in both hard copy and digital formats. The O&M manual maintenance agreement along with a site map showing the BMP locations shall be recorded with the final plat. The O&M manual will include the following:

1. Owner name, address, business phone number, home phone number, email address, cellular phone number, pager number;
2. Site drawings (8½" by 11" or 11" by 17"), showing both plan and cross-section views, showing the infrastructure and applicable features, including dimensions, easements, outlet works, forebays, signage, etc., as well as an overall site map of the development showing all structures;
3. Guidance on both owner-required periodic inspections and inspections to be performed by City representatives, including reference to the use of applicable checklists and reference to applicable inspection fees from the IndyGov web-site under the Department of Metropolitan Development;
4. Requirement of owner to perform maintenance specified by City inspection, if any;
5. Guidance on routine maintenance, including mowing, litter removal, woody growth removal, signage, etc.;
6. Guidance on remedial maintenance; such as inlet replacement, outlet works maintenance, etc.;
7. Guidance on sediment and trash removal, both narrative and graphical, describing when sediment removal should occur in order to insure that BMPs and other infrastructure remain effective as water quality and/or quantity control devices;
8. A statement that the City's representatives have the right to enter the property to inspect the infrastructure;

9. A tabular schedule showing inspection and maintenance requirements; and
10. Identification of the property owner as the party responsible for all maintenance, including cost.

102.07 Single and
Double-Family
Dwellings

Site plans for single- or double-family dwellings, additions to single- or double-family dwellings and accessory structures as described in Section 561 - 225 "When a professionally prepared and certified drainage plan is not required" shall indicate the nature and location of all work to be accomplished pursuant to the stormwater permit. A list of minimum requirements for a one-family, two-family dwelling or accessory structure is provided on pages A1-10 and A1-11.

In general, the site plan shall be neat, accurate, and legible, and include the following information:

1. The legal description of the property;
2. The exact, legal street address for the property;
3. The dimensions and borders of the parcel;
4. The name and address of the owner;
5. An arrow indicating north;
6. Location of all existing and proposed improvements, structures, paved areas, easements and rights-of-way on the site;
7. Existing and proposed grading showing positive drainage by contouring or sufficient spot elevations;
8. Location and elevation of all existing and proposed swales, ditches, culverts, drainage channels, surface or subsurface drainage devices and the direction of flow;

All single-family residential construction with land disturbing activities less than one-acre shall employ, at a minimum, perimeter type erosion and sediment control practices including, but not limited to, straw bales and/or silt fences and gravel drives. Tracking of sediment onto streets is to be minimized through the use of perimeter controls and vehicle access controls and limitations.

102.08 Incomplete
Stormwater Permit
Applications

Engineering design plans and specifications submitted to the Department for issuance of an approved stormwater permit that do not meet the minimum requirements of Section 561 -224. "Professionally prepared and certified drainage plans" or the contents of this Manual will be handled as described in Section 561 – 224, "Professionally prepared and certified drainage plans" of the City Code.

102.09 Deviations from
Approved Plans

As stated in Section 561 – 227, "Notice of change in permit information; amendment of permits and plans" of the City Code," substantial

deviations from the approved site development plans and specifications shall not be made without written approval from the Department." Realistically, there are always minor variations to proposed plans. Variations of ± 5 percent will be allowed without the need for approval from the Department, though sound engineering judgment should be exercised in assessing impacts of slightly reducing such things as capacities or increasing such things as velocities and peak flows. Examples of substantial deviations from the approved plan shall include, but are not limited to, the following changes:

1. Pipe size changes.
 2. Pipe grade changes that will affect the hydraulic capacity of the stormwater facility.
 3. Stormwater facility horizontal alignment changes greater than five (5) feet. Where the proposed stormwater facility has been required to be constructed within a right-of-way or stormwater easement, horizontal changes that place the stormwater facility outside of the limits of the right-of-way or stormwater easement area will not be accepted by the Department. Storm drains constructed on privately owned property, outside of public rights-of-way or stormwater easements may vary more than five (5) feet in the horizontal alignment, provided the hydraulic performance of the facility has not been altered, and no other portion of the approved construction plans has been changed.
1. Construction materials and installation that are not in conformance with the requirements of this Manual.
 2. Changes in grade of the site that will effect the stormwater direction, velocity, amount or concentration or may expose structures or streets to a greater risk of flooding than under approved plans.

102.10 Maintenance Responsibilities

The responsibility of maintenance of stormwater facilities shall be as set forth by Section 561 - 211. "Maintenance of drainage facilities" of the Indianapolis City Code.

Maintenance access shall be provided to stormwater facilities as set forth herein to assure continuous operational capacity of the stormwater facility. As a means of providing the necessary availability for access to stormwater facilities, sufficient stormwater easement areas or rights-of-way shall be required by the Department to achieve satisfactory present and future drainage of the parcel and the area surrounding the parcel as referenced in Section 561 – 232, "Execution of covenant" and Section 561 - 233 "Dedication of easement" of the City Code. A form that lists the requirements to encroach on stormwater easements is provided on page A1-13.

102.11 Performance Sureties

Performance bonds or irrevocable letters of credit, made payable to the Indianapolis Department of Metropolitan Development, may be required to be submitted as described in Section 561 - 231, "Posting of bond." These bonds, irrevocable letters of credit, or other accepted performance sureties may be a part of the total bonding required by the plats committee of the Metropolitan Development Commission. Performance

sureties shall be in a form approved by the Department, and may be based upon the contract amount for the cost to complete proposed site improvements, including:

1. Total installed cost for storm drain pipe, culvert, manhole, and box inlet installation, and
2. Total cost for site filling and grading, including construction of open drainage swales and detention/retention facilities.

A separate performance surety will be required for the installation of erosion and sediment control measures and regrading of minor drainage collector swales. Erosion and sediment control performance sureties shall be in a form approved by the Department, and may be based upon the contract amount for the cost to complete proposed sediment and erosion control installation including:

1. Re-establishment of erosion and sediment control devices,
2. Re-grading of the site,
3. Seeding of the entire denuded area,
4. Cleaning of the storm drain system, and
5. Reestablishing final grades and elevations for stormwater BMPs.

Prior to the release of the stormwater facility, and erosion and sediment control performance sureties, a maintenance surety will be required. This surety will be in an amount not to exceed twenty (20) percent of the cost of construction and cover a period of three (3) years from the date of acceptance by the Department.

Release of performance sureties will be performed as described in Section 103.04 of this Manual.

SECTION 103 CONSTRUCTION INSPECTION AND APPROVAL

103.01 Introduction

The installed storm sewer system shall not be accepted by the Department until all requirements for inspection and testing established by these regulations, and Section 561 of Indianapolis Code, are completed. Inspection of the stormwater drainage system and associated land grading and erosion control measures shall be completed by the Department as set forth herein to ensure conformance with the approved site construction plan and supporting documents. Any portion of the stormwater facility not passing the tests prescribed herein shall be repaired or replaced to the extent required by the Department, and retested.

103.02 General Requirements

The Contractor and/or Owner shall provide written notice to the Department of the planned commencement of construction forty-eight (48) hours prior to such commencement. A Stop-Work-Order shall be issued by the Department for all projects that are proceeding without the required "Notification of Work."

A pre-construction meeting to include a representative of the Department, the Department's Observer, the Contractor, and the Land Owner or Developer will be required. This meeting will be scheduled by the Department after the issuance of a "Notification of Work."

Once construction begins, the contractor shall be responsible for informing and/or notifying the Observer assigned of the following:

- Daily work schedule including any changes in schedule.
- Prior notification if work is to be performed on weekends and/or holidays.
- Date mandrel tests are to be performed.
- Date "as-built" verification is to be performed.

The Department, upon request of the Contractor and/or Owner, will schedule the Final Inspection.

All testing required shall be performed under the observation of the Department's Observer. It shall be the Contractor's responsibility to schedule the testing with the Observer and/or Department. Test results obtained in the absence of the Department's Observer will not be accepted.

103.03 Construction Observation Services

Construction observation services, testing, and "record" drawings as set forth in this manual shall be provided for those developments meeting the following criteria:

1. All platted single- and double-family and subdivided and platted commercial/industrial developments.
2. All commercial/industrial developments that will not be subdivided and platted, which however, plan a disturbance of 5- acres or more of land area.
3. All land alterations that involve installation of Class I and Class II stormwater systems.

The storm drain system shall not be accepted by the Department until all requirements for inspection and testing established by this Manual are completed. Any portion of the stormwater facility not passing the tests prescribed herein shall be repaired or replaced to the extent required by the Department, and retested.

Prior to issuance of an approved stormwater permit and the commencement of construction of a storm drain system, the Owner shall make arrangements with the Department for construction observation services to be provided.

The Department shall send a letter to the Owner stating the amount of payment to be made to the Department for observation services to be rendered by representatives of the Department. The amount provided in the letter shall be seventy-five (75) percent of the total estimated cost of the observation services based on an estimated project completion time.

Upon payment of the seventy-five (75) percent cost, the Contractor and/or Owner shall provide written notice to the Department of the planned commencement of construction seventy-two (72) hours prior to such commencement.

A pre-construction meeting to include a representative of the Department, the Department's observer, the Contractor, and the Land Owner or Developer will be scheduled by the Department which will include a discussion and observation of the erosion and sediment control measures. At that time, a "Notification of Work" will be issued by the Department. A Stop-Work-Order shall be issued by the Department for all projects that are proceeding without the required "Notification of Work."

103.04 Drainage Fees

The following schedule of fees is current as of May 1, 2007. Changes to this fee schedule will be posted on the City's website.

Platting of residential subdivision:

- | | |
|-----------------------------|---|
| 1. Preliminary plat review: | \$395.00 |
| 2. Final plat review: | \$395.00 (up to 10 lots);
\$55.00 (for each lot in excess of 10) |

Permit fees for Construction of Residential Structures:

- | | |
|--|----------|
| 1. New structure in approved subdivision | \$65.00 |
| 2. New structure in subdivision platted prior to 1980 or by metes and bounds | \$120.00 |
| 3. Addition to residential structure | \$50.00 |

Review Fees for Commercial and Subdivision Development:

- | | |
|--|----------|
| 1. Initial fee for plat and/or plan submittal with up to 3 hours of technical review | \$200.00 |
| 2. Hourly rate with private inspection (over 5 acres): | \$180.00 |
| 3. Hourly rate without private inspection (under 5 acres): | \$215.00 |
| 4. Hourly rate for accelerated review with private inspection (over 5 acres): | \$275.00 |

Note: Accelerated reviews are available on a limited first come first serve basis

Miscellaneous fees:

- | | |
|--|----------|
| 1. Initial fee for processing of encroachment and other petitions (up to 3 hours): | \$395.00 |
| 2. Hourly fee for processing of encroachment and other petitions (over 3 hours) | \$215.00 |

- | | | |
|--|----------|----------|
| 3. Stormwater Connection permit | \$120.00 | |
| 4. Copying charges: | | |
| a. Specifications/standards manual | \$55.00 | |
| b. Copy of ordinance | \$10.00 | |
| c. Contour maps/plan sheets | \$10.00 | |
| 5. BMP Inspection Fees (per BMP): | | |
| a. Inspections for first 3 years, paid lump sum in year 1 | \$705.00 | per BMP |
| b. Annual BMP inspection after year 3 | \$235.00 | per BMP |
| c. Additional inspections required due to maintenance issues | \$235.00 | per hour |

EXAMPLE BMP INSPECTION FEE CALCULATIONS

Example 1. XYZ Enterprises has a five-acre site with a wet pond for treating the bulk of the site runoff and a perimeter sand filter on a parking lot. The initial fee would then be two (2) times the \$705 fee, or \$1410. Beginning in year 4 the annual inspection fee will be two (2) times the \$235 annual fee, or \$470 per year.

Example 2. RST Enterprises adds a three quarter acre parking lot to an existing facility. The runoff from the expansion includes six bioretention medians in the parking lot for water quality that discharge to a small detention pond to meet the City's detention requirement. The bioretention medians represent a single water quality BMP. The detention is required only for runoff volume control and is not a BMP. The initial fee would then be one (1) times the \$705 fee, or \$705. Beginning in year 4 the annual inspection fee will be one (1) times the \$235 annual fee, or \$235 per year.

103.05 Testing

Once constructed, all storm sewer pipes and manholes shall be soil tight. The Contractor shall repair to the satisfaction of the Department all visible points of possible bedding and/or backfill infiltration into the system. The method of repair shall be per the approval of the Department. When necessary, the Contractor shall remove and reconstruct as much of the work as is necessary to obtain a system that passes the minimum tests prescribed herein.

1. Mandrel Tests for Plastic Pipes

All storm sewers using flexible pipe shall be tested for deflection by means of a go/no-go mandrel gage or other methods as approved by the Department.

The mandrel deflection test shall be as follows:

1. Waiting Period

The mandrel deflection test shall be done no sooner than thirty (30) days after final backfill has been placed.

2. Equipment

Mandrels shall be constructed with nine (9) or ten (10) arms. Mandrels with fewer than nine (9) arms are not allowed.

The Length (L) shall be measured between points of contact on the mandrel arm.

The Diameter (D) mandrel dimension shall carry a tolerance of ± 0.01 inches.

3. Allowable Deflection

The allowable deflection shall be 5% based on the inside diameter as determined on a case-by-case evaluation of the pipe design.

The Contractor shall provide proving rings to check the mandrel. The proving rings shall be clearly labeled with the dimensions and ASTM Standard.

4. Testing Procedure

a. The mandrel shall be hand pulled through all sections of the sewer lines.

b. Determination of Line Acceptance

If the mandrel can be hand pulled through the entire length of the section tested, the section shall have passed the test.

c. Determination of Line Failure

If the mandrel cannot be hand pulled through the entire length of the section tested, the section shall have failed the test.

The Contractor shall be required to uncover, replace, or repair any section of sewer not passing the mandrel test.

2. CMP and RCP Inspections

Forty-two (42) inch diameter and smaller reinforced concrete and corrugated metal pipe may be required to be inspected through closed circuit television viewing (CCTV) by the Department's representative as described herein. In those instances where CCTV is a required part of the stormwater permit approval, this televised viewing shall be completed in conformance with these minimum guidelines.

All reinforced concrete and corrugated metal storm sewer pipes which

are 36" diameter and smaller and are located within a public right-of-way or drainage easement shall be visually inspected by lamping in the presence of the Construction Observer or other representative of the Department.

These inspections shall be required in order to identify, as examples, excessive sedimentation, joint failures, excessive deflections (CMP), damaged coatings or pavings (CMP), structural defects, misalignments, sags, or other system defects which have the potential of affecting the hydraulic performance, durability, or structural integrity of the line segment. Reference should be made to Chapter 400 of this Manual for guidance on criteria sufficient to warrant rejection of the installed storm sewer system.

Excessive deflection of CMP's shall be considered to exist under the following conditions: variations from a straight centerline; elliptical shape in a pipe intended to be round; dents or bends in the metal. Metallic or bituminous coatings that have been scratched, scraped, bruised, or otherwise broken shall be considered acceptable criteria for rejection of the installed system.

Those storm sewer systems of 36" diameter and smaller which are found through lamping to possess greater than 3 defects noted per line segment during the above referenced visual inspection shall have that individual line segment further inspected by closed circuit television inspection between manholes as follows:

1. A camera equipped with remote control devices to adjust the light intensity and one thousand (1,000) lineal feet of cable shall be provided. The camera shall be able to transmit a continuous image to the television monitor as it is being pulled through the pipe. The image shall be clear enough to enable the Department to easily evaluate the interior condition of the pipe. The camera should have a digital display for lineal footage and project number and an audio voice-over shall be made during the inspection identifying any problems.
2. The pipe shall be thoroughly cleaned before the camera is installed and televising is commenced. Cleaning of the pipe shall be the responsibility of the Owner.
3. The VHS tape of the entire storm sewer line and reproduction map indicating the pipe segment numbers of all the pipe that has been televised shall be submitted to the Department for review and placement in their permanent file.

Any pipe and/or joint found to be defective as a result of the televised viewing shall be required to be repaired or replaced to the satisfaction and approval of the Department. A re-televising of that portion of the storm sewer line identified as needing repair or replacement shall be required.

All RCP and CMP storm sewer pipes and open culverts greater than 36" in diameter and located within a public right-of-way or drainage easement shall be visually surveyed along their entire length in the presence of the Construction Observer or other representative of the Department.

These inspections shall be required in order to identify, as examples, excessive sedimentation, joint failures, excessive deflections (CMP), damaged coatings or pavings (CMP), structural defects, misalignments, sags, or other system defects which have the potential of affecting the hydraulic performance, durability, or structural integrity of the line segment. Reference should be made to Chapter 400 of this Manual for guidance on criteria sufficient to warrant rejection of the installed storm sewer system.

Excessive deflection of CMPs shall be considered to exist under the following conditions: variations from a straight centerline; elliptical shape in a pipe intended to be round; dents or bends in the metal. Metallic or bituminous coatings that have been scratched, scraped, bruised, or otherwise broken shall be considered acceptable criteria for rejection of the installed system.

Any pipe and/or joint found to be defective as a result of the televised viewing shall be required to be repaired or replaced to the satisfaction and approval of the Department. A re-televising of that portion of the storm sewer line identified as needing repair or replacement shall be required.

3. Manhole and Box Inlet Inspection

Each manhole and/or box inlet structure within all storm sewer line segments shall be visually inspected by a representative of the Department for excessive leakage, backfill infiltration, or improper workmanship and materials. Manholes or box inlet structures which fail to meet minimum construction standards shall be repaired or, if necessary, replaced, and re-inspected.

103.06 Release of Sureties

Notice of the scheduled date for completion of construction shall be provided to the Department at least seventy-two (72) hours prior to its planned completion. The Contractor or Owner will schedule the final inspection with the Department's observer. After successful completion of the final inspection, the storm drain and site grading performance sureties may be released after submittal and approval by the Department of the following information:

1. "Record" drawings prepared under the supervision of and certified by a Professional Engineer or Land Surveyor registered in the State of Indiana.
2. For subdivided and platted or developments larger than five (5) acres, a copy of the storm drain maintenance bond in a form approved by the Department.
3. A "Certificate of Completion and Compliance" from the Department's Observer certifying that construction observed has been performed and completed in conformity with all requirements of Section 561 - 241 of Indianapolis City Code and this Manual. The certificate shall be as presented on page A1-13.

For platted single- and double-family developments, the performance surety for installation of required erosion and sediment control measures

may be released only after construction has been completed on eighty-one (81) percent or more of all single- or double-family homes proposed within each individual section of the development.

103.07 Record Drawings

As part of the final acceptance process, record drawings of the stormwater facilities must be submitted to the Department, as set forth herein, for the following types of developments:

- all platted subdivisions
- industrial and commercial sites one acre and larger
- all public infrastructure

Record drawings shall be certified by a Professional Engineer or Land Surveyor registered in the State of Indiana, and provide the following information:

1. Building pad elevations.
2. Structure inverts, pipe inverts, top-of-casting's, and the flowline of rear and/or side yard swales at fifty (50) foot intervals or at lot lines.
3. Horizontal alignment of storm drain pipes, culverts, BMPs, streets, and storm drain structures, to a minimum accuracy of +/- two (2) feet. All BMPs will be located by Indiana State Plane Coordinates.
4. The as-built survey of all detention / retention facilities as well as as-built profile of all drainage conveyances (ditches, swales, etc).
5. The horizontal location and/or bank cross sections for all detention/retention facilities or other information sufficient to verify that the constructed detention/retention facility provides the required minimum runoff storage volume.
6. A tag reference to the operations and maintenance manual as required for stormwater structures will be included.

Record drawings will be submitted as both digital and either blue-line copies or original mylars. The digital submittal will be in a format compatible with the Indianapolis Mapping and Geographical Infrastructure System (IMAGIS) database.

103.08 Enforcement of Standards

Failure to comply with those minimum guidelines set forth by this Manual may necessitate one or more of the following actions to be taken by the Director:

1. Posting of a Stop-Work-Order on the project.
2. The procurement of performance sureties.
3. A denial of further stormwater permits for the subject project in noncompliance with this Manual.
4. Necessary legal action by the Department to effect the

implementation of the approved plan or restoration of the site.

SECTION 104 OTHER REQUIREMENTS

104.01 Floodplain Management

Floodplain management shall be in accordance with Chapter 735, Ordinance Establishing Flood Control Zoning Districts (Chapter 735). The City of Indianapolis has adopted floodplain regulations through the Flood Control District Zoning Ordinance of Marion County, Indiana. The most current effective Flood Control District Zoning Ordinance is on the IndyGov web-site and referenced from the Stormwater Standards section. In addition, all levees constructed will be required to be designed and operated by the Owner in accordance with FEMA requirements at the time it is designed.

Notwithstanding any other requirements of this Manual or the provisions contained in Chapter 735, the City of Indianapolis may, on a case by case basis, place additional requirements on developments and redevelopments in areas located in dam failure inundation zones, levee failure residual risk areas, or areas shown as protected by dams, levees, or other flood control facilities.

104.02 Stormwater Quality

The City of Indianapolis and Marion County are subject to the requirements of a stormwater discharge control permit that has been issued by the Indiana Department of Environmental Management (IDEM) under the National Pollutant Discharge Elimination System (NPDES). Under this permit the City is required to establish regulations, standards, and policies that address the water quality impacts of stormwater runoff from redeveloping areas and areas of new development. The policies set forth in this section are intended to meet the requirements that the City address pollutants of concern in local stormwater runoff and comply with narrative standards in the permit.

The pollutants of concern that are to be addressed in stormwater runoff from newly developing and redeveloping areas include:

Totals suspended solids (TSS). TSS¹ is a problem pollutant in stormwater runoff nationally, regionally, and in the City of Indianapolis. In 2001 the City adopted a policy that the control of stormwater runoff quality countywide will be based upon the management of TSS. The target TSS removal rate is 80% on an average annual basis. All best management practices (BMPs) approved for use in the City of Indianapolis will be capable of meeting or exceeding the 80% TSS removal target whether the control be a single structure or a series of controls.

Floatables. The narrative standards in Section I.B.3 of the City's NPDES Stormwater Permit (No. INS040001) state that certain categories of floatables, or floating debris are not permitted in stormwater discharges. The policy for floatable control in Indianapolis is that the drainage from all areas of new development and redevelopment will be designed to so as to capture and retain floating material. Individual components of the stormwater control

¹ For the purposes of this requirement, TSS are defined as particles that will pass through a 125 micron screen. Larger particles are considered to be part of the total solids load of the stormwater runoff.

system do not have to comply with this policy, but the final discharge from the development site must.

The water quality management program of the City of Indianapolis is performance-based. In a performance-based program it is essential that any approved BMP be properly maintained in order to insure that the BMP perform as designed. An operations and maintenance plan for any approved structure will be required (see Section 102.06). As will be stated in the operation and maintenance manual, maintenance will be the responsibility of the property / BMP owner. The city encourages the use of high-efficiency, low maintenance BMPs that have the potential for removal of multiple stormwater pollutants.

For the purposes of redevelopment of lots, the gross built upon density, or percent imperviousness, will be the basis for design computations of runoff volume, peak, and pollutant wash-off load for water quality computations.

For the purposes of all projects, including commercial, industrial, residential, transportation, recreation, etc., if the cumulative disturbed area is less than ½ acre, the development will be exempt from requirements for on-site BMPs. The cumulative total disturbed area will be evaluated based on City records of permit activity from October 1, 2001. However, the City has the discretion to exempt redevelopment activities disturbing up to 5% more area.

Plans approved and permitted prior to the effective date of these policies will not be required to comply with this policy unless construction has not commenced within 365 days after the effective date of this policy. Each phase of a multi-phased project is considered part of a single project for the purposes of complying with this policy. Master plan approval does not constitute plan approval.

BMPs defined in Chapter 700 as being capable of meeting the specified performance criteria for pollutant removal will be acceptable if designed to the standard specifications in Chapter 700.

Alternative BMPs can be approved but will require that all provided computations be professionally certified, and that literature references of the historical performance of the BMP for TSS removal be provided to the Department of Metropolitan Development for review.

Manufactured BMPs, such as catch basin inserts that don't meet the requirements outlined in Chapter 700, must be professionally certified and approved by the New Product Committee prior to the approval for use.

This policy has been adopted as the basis of the county's stormwater quality management program for all areas of the county except within the city limits of Beech Grove, Lawrence, Southport and Speedway.

The effective date of this policy is October 1, 2001.

imperviousness, undersized stormwater infrastructure, and a growing demand to redevelop the space. In Indianapolis, redevelopment pressures exist both in the downtown area and in older suburban residential and commercial areas. The intense development of the combined sewer service area has resulted in large volumes of stormwater runoff, major system capacity issues, and frequent overflows of the combined sewer system into local waterways. The City is in the process of dealing with these capacity issues and the related water quality concerns in the implementation of a long term plan to control combined sewer overflows. Reduction of runoff from redeveloping areas is a key feature of this program.

When properties are redeveloped they are subject to the same policies and design standards as are applied to new development projects; including stormwater permitting, detention, sediment and erosion control, and water quality management requirements. The complicating factor for many redevelopment projects is the lack of available land on which to develop detention and water quality control facilities. The following paragraphs are intended to provide some guidance on how redevelopment projects can be implemented while still meeting the stormwater design standards.

1. Minimize imperviousness. The best way to minimize the impact of stormwater design regulations on a development is to minimize the impact the development has on stormwater runoff. By building up (multi-story development) rather than out (sprawling one-story development) green space can be incorporated into the site plan resulting in reduced stormwater infrastructure needs, costs, and eventually user fees. The use of green development techniques, as discussed in Section 104.04, can also result in lower infrastructure costs and reduced stormwater user fees.
2. Go to the rooftop. If the project has issues that would make ground level or below ground stormwater management infrastructure impractical it might be possible to address storage and/or water quality issues by looking at the rooftops for detention storage and/or water quality control. Rooftop detention of stormwater is fairly common in downtown areas of major cities around the world, particularly cities that deal with combined sewer capacity issues such as those in Indianapolis. Rooftop detention can be employed in conjunction with catch basin inserts or ground level stormwater quality units to meet the City's water quality standards. Another *growing* alternative is the concept of green roofs. The green roof concept provides detention of stormwater runoff, reduces runoff by vegetative interception and evapotranspiration, and provides the added benefit of reducing energy consumption for heating and cooling the building.
3. Go underground. If reduced imperviousness, rooftop alternatives, and green design are not practical, the on-site stormwater management program may be provided below ground. There are numerous storage system solutions for use under parking lots that can provide the detention capacity control and storage volume needed for most projects. These solutions can be integrated with catch basin inserts and/or other in-ground stormwater quality units to also meet the water quality control requirements of the City.

104.04 Green Development Incentives

The goal of stormwater management requirements for areas of new development and significant redevelopment is to reduce the impact of post-construction stormwater runoff on the local drainage area and watershed. This can be achieved by (1) maximizing the use of site design and nonstructural methods to reduce the generation of runoff and pollutants; (2) managing and treating stormwater runoff through the use of structural stormwater controls; and (3) implementing pollution prevention practices to limit potential stormwater contaminants. One method of reducing the impact of new development and redevelopment on both stormwater runoff quality and quantity is the concept of low impact or green development techniques.

Traditionally, the development of a property results in the conversion of pervious areas into impervious surfaces. The pre-development pervious areas, naturally vegetated areas that allow rainwater to infiltrate into the ground to replenish groundwater resources and nourish plants. The post development impervious areas retard or prohibit the infiltration of rainwater, thus creating increased stormwater runoff peaks and volumes and creating water quality problems. In many cases the pervious surfaces that remain after development have lower permeability than in their undisturbed state and quickly become saturated by the increased runoff, resulting in increased runoff from these areas during intense rainfall.

Green development techniques lessen the impact of development and redevelopment on downstream drainage area by reducing the amount of impervious surface. Although some of the “green” options do not exactly recreate natural conditions, they approximate those conditions to the extent that they lower runoff curve numbers and/or lengthen times of concentration. The net result is that less impervious surface means lower runoff peak flows, lower runoff volumes, and lower pollutant export, all of which can mean lower development costs. For the post-construction property owner the reduced imperviousness may mean lower stormwater user fees, and in the case of green roofs reduced heating/cooling costs.

Examples of the types of features that might be part of a green design approach include:

- Green roofs
- Roof gardens
- Pervious pavement
- Tree planting
- Vegetated swales
- Grassy swales
- Street swales
- Vegetated filter strips
- Biofiltration
- Vegetated infiltration basins
- Sand filters
- Wet, extended wet, and dry detention ponds
- Stormwater wetlands
- Manufactured treatment technologies
- Structural detention facilities
- Rainwater harvesting

- Drywells

For more information on the incentives of green development, including example computations on infrastructure cost savings, please refer to the City of Indianapolis website, www.indygov.org and search for “stormwater design and construction specifications manual.” The green development incentive guidelines will be published with the design manual.